SPRING MVC

Outline

- What is and Why Spring MVC?
- Request life-cycle
- DispatcherServlet
- URL Handler mapping
- Controllers
- View & View Resolvers

What is Spring MVC?

- Spring MVC is a request-based Web application framework. The framework defines strategy interfaces for all of the responsibilities which must be handled by a modern request-based framework
- It takes advantage of Spring design principles
  - Dependency Injection
  - Interface-driven design
  - POJO without being tied up with a framework

Why Spring MVC?

- Spring provides a very clean division between controllers, JavaBean models, and views
- *Powerful and straightforward configuration of both framework and application classes as JavaBeans*
- *Adaptability, non-intrusiveness, and flexibility*
- *Reusable business code*, *no need for duplication*
- *Customizable handler mapping and view resolution*
- *Flexible model transfer*

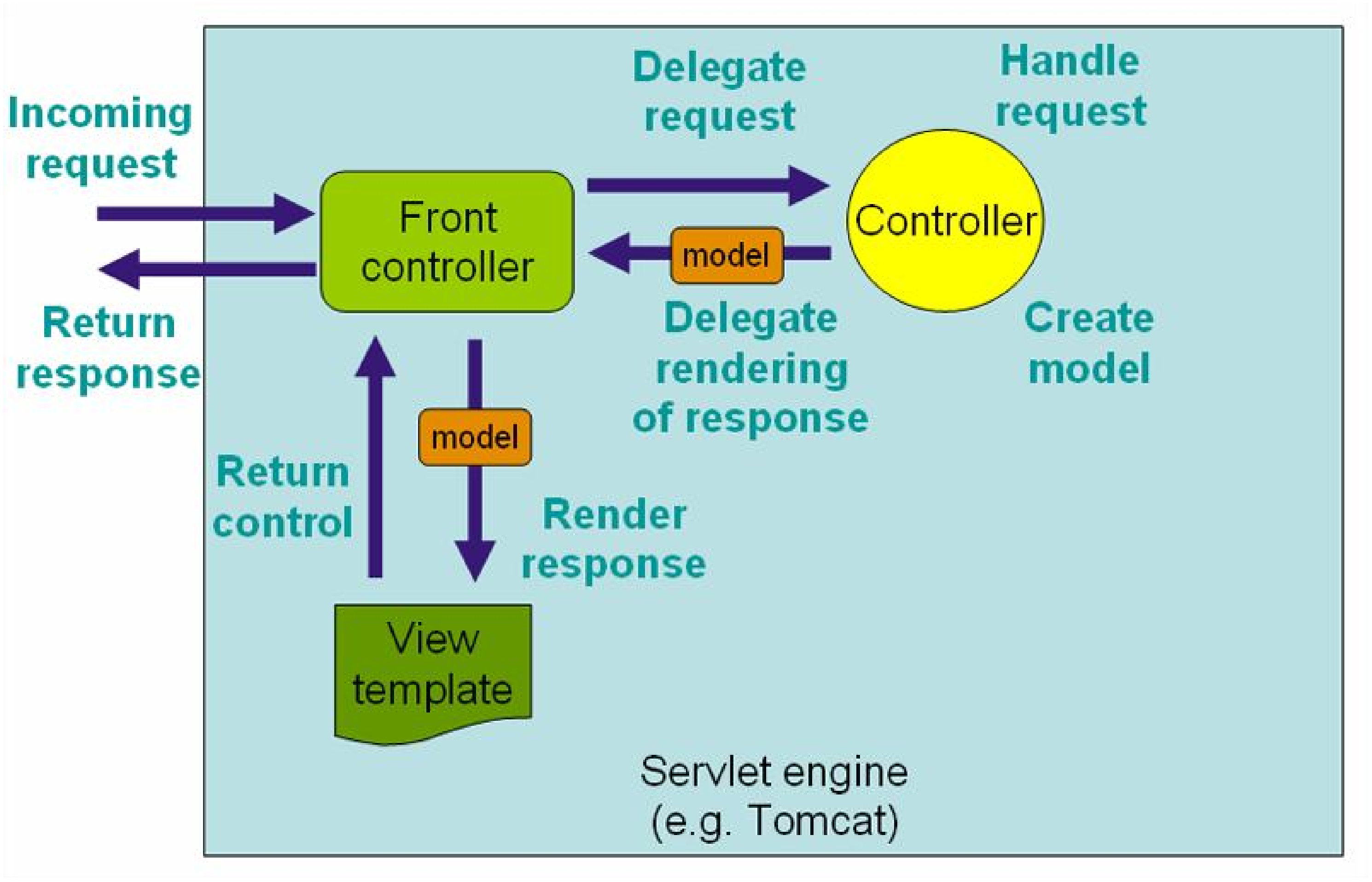
Why Spring MVC?

- *Customizable locale and theme resolution, support for JSPs with or without Spring tag library, support for JSTL, support for Velocity without the need for extra bridges, and so on*
- *A simple yet powerful JSP tag library known as the Spring tag library*
- *A JSP form tag library, introduced in Spring 2.0, that makes writing forms in JSP pages much easier*
- *Beans whose lifecycle is scoped to the current HTTP request or HTTP Session*

Request Life-cycle

- *DispatcherServlet receives the HTTP request*
- URL Handler mapping
  - Controller is invoked
  - Controller returns *ModelAndView object*
- *ViewResolver selects a view*

Request Life-cycle



DispatcherServlet

- The Spring Web MVC framework is designed around a DispatcherServlet
- DispatcherServlet is an expression of the “Front Controller” design pattern
- Dispatches requests to Handler Mapping which invokes the appropriate controller
- DispatcherServlet completely integrated with the Spring IoC container and as such allows you to use every other feature that Spring has.

Configuring DispatcherServlet

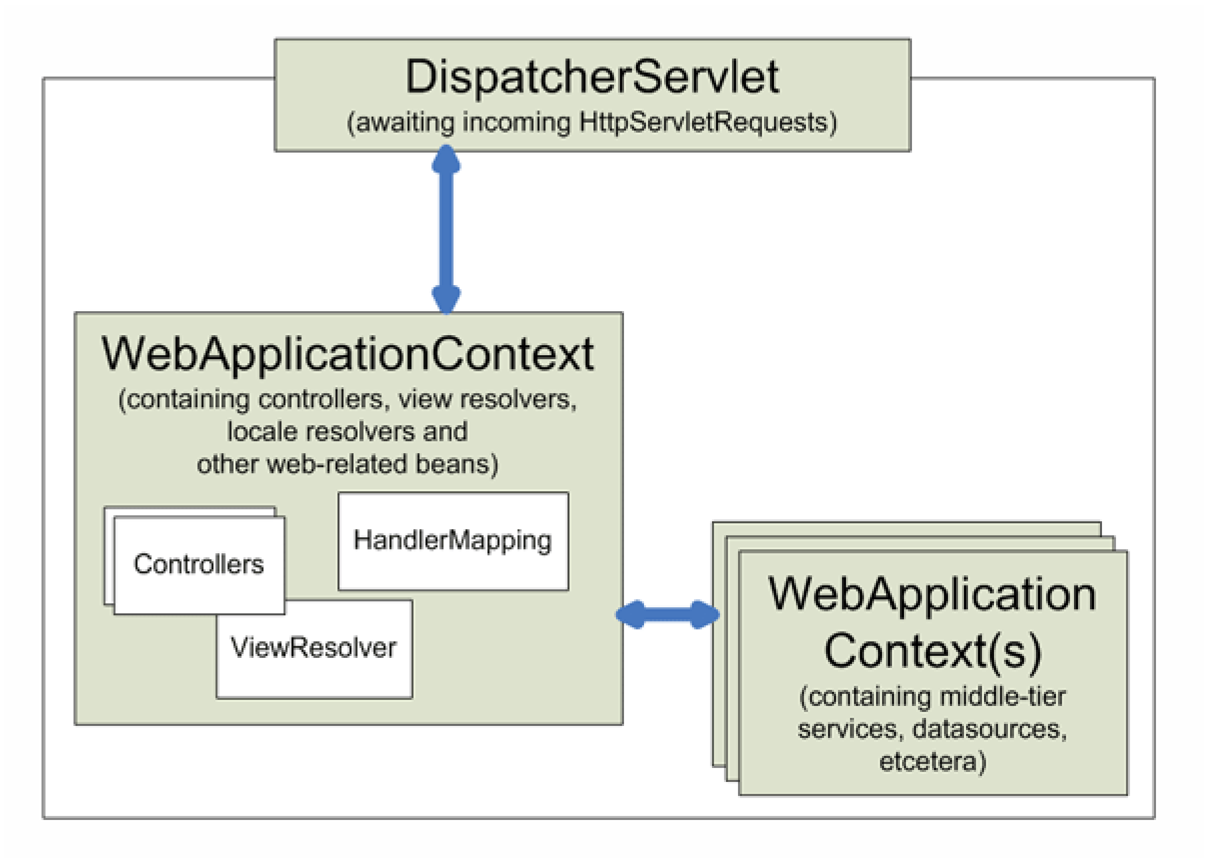
- The DispatcherServlet is an actual Servlet (it inherits from the HttpServlet base class), and is declared in the web.xml

```
<servlet>
   <servlet-name>appServlet</servlet-name>
<servlet-class>
     org.springframework.web.servlet.DispatcherServlet
</servlet-class>
<load-on-startup>1</load-on-startup>
</servlet>
…………………………….
<servlet-mapping>
   <servlet-name>appServlet</servlet-name>
   <url-pattern>*.htm</url-pattern>
</servlet-mapping>
```

Web ApplicationContext

- Each DispatcherServlet has its own WebApplicationContext
- Inherits all the beans already defined in the root WebApplicationContext
- Upon initialization of a DispatcherServlet, the framework *looks for a file named [servlet-name]-servlet.xml* in the WEB-INF

Web ApplicationContext


DispatcherServlet
(awaiting incoming HttpServletRequests)
WebApplicationContext
(containing controllers, view resolvers, locale resolvers and other web-related beans)
Controllers
HandlerMapping
ViewResolver
WebApplication Context(s)
(containing middle-tier services, datasources, etcetera)

Web ApplicationContext

- The WebApplicationContext is an extension of the plain ApplicationContext
- It has some extra features necessary for web applications.
- It differs from a normal ApplicationContext in that it is capable of resolving themes , and that it knows which servlet it is associated with
- The WebApplicationContext is bound in the ServletContext

Loading More than One Context File

- By default Dispatcher servlet will load only one context configuration file
- For additional context configuration file you need to configure ‘Context Loader’

```
<listener>
     <listener-class>
     org.springframework.web.context.ContextLoaderListener
     </listener-class>
</listener>
…….
<context-param>
     <param-name>contextConfigLocation</param-name>
     <param-value>
               /WEB-INF/appServlet-service.xml
               /WEB-INF/appServlet-data.xml
               /WEB-INF/appServlet-security.xml
     </param-value>
</context-param>
```

DispatcherServlet Configuration

- The Spring DispatcherServlet uses special beans to process requests and render the appropriate views
- These beans are part of Spring Framework
- You can configure them in the WebApplicationContext, just as you configure any other bean, however, for most beans, sensible defaults are provided so you initially do not need to configure them

DispatcherServlet Configuration

- HandlerMapping
  - Routing of requests to handlers
- HandlerExceptionResolver
  - Maps exceptions to error pages
  - Similar to standard Servlet, but more flexible
- ViewResolver
  - Maps symbolic name to view
- MultipartResolver
  - Handling of file upload
- LocaleResolver
  - Default uses HTTP accept header, cookie, or session

Spring MVC at Glance

- Write the controller class that performs the logic behind the homepage.
- Configure the controller in the DispatcherServlet's context configuration file
- Configure a view resolver to tie the controller to the view.
- Write the view that will render the homepage to the user

Url Handler Mappings

- Instructs *DispatcherServlet which Controller to invoke* for a request
  - Dependency Injection
- Implements *HandlerMapping interface*
- Spring MVC comes with two implementation classes of *HandlerMapping interface*
  - *SimpleUrlHandlerMapping*
  - *BeanNameUrlHanlderMapping*

SimpleUrlHanlderMapping

```
<bean id="urlMapping"
class="org.springframework.web.servlet.handler.SimpleUrlHandlerMapping”>
        <property name="mappings">
                <props>
                <prop key="/login">loginController</prop>
                <prop key="/employee">employeeController</prop>
        </property>
</bean>
```

BeanNameUrlHanlderMapping

```
 <bean id="defaultHandlerMapping"
   class="org.springframework.web.servlet.handler.BeanNameUrlHandlerMapping"/>

<bean name="/login" class=“loginController"/>
<bean name="/employee" class=“employeeController"/>
```

DefaultAnnotationHandlerMapping

- With the introduction of Spring 2.5, the DispatcherServlet enables the DefaultAnnotationHandlerMapping, which looks for @RequestMapping annotations on @Controllers.

```
<beans>
          <bean id="handlerMapping"
          class="org.springframework.web.servlet.mvc.annotation.Def
          aultAnnotationHandlerMapping“/>
 <beans>
```

- To enable autodetection of such annotated controllers

```
<beans…>
          <context:component-scan base-package=
                    “com.examples.spring.web.mvc"/>
          // ...
 </beans>
```

Controllers

- Receives requests from DispatcherServlet and interacts with business tier
- Implements the Controller interface
- Returns ModelAndView object
- ModelAndView contains the model (a Map) and either a logical view name, or implementation of View interface

Controller Classes

- AbstractConroller
  - BaseCommandController
- AbstractCommandController
- AbstractFormController
  - SimpleFormController
  - AbstractWizardController
  - MultiActionController
  - ParameterizableViewController

Annotation-based Controller

- Uses annotations such as @Controller, @RequestMapping, @RequestParam, @ModelAttribute
    - Controllers implemented in this style do not have to extend specific base classes or implement specific interfaces.
    - Furthermore, they do not usually have direct dependencies on Servlet APIs, although you can easily configure access to Servlet facilities.

Example

- Controller Class

```
@Controller
 public class HelloWorldController {
    @RequestMapping("/helloWorld")
        public ModelAndView  helloWorld() {
            ModelAndView mav = new ModelAndView();
            mav.setViewName("helloWorld");
            mav.addObject("message", "Hello World!");
        return mav;
        }
}
```

Annotation Used

- @Controller

  Indicates that a particular class serves the role of a controller

- @RequestMapping

  To map URLs such onto an entire class or a particular handler method

- @RequestParam

  Use the @RequestParam annotation to bind

  request parameters to a method parameter

Annotation Used

- @ModelAttribute
  Used controller gets a reference to the object holding the data entered in the form
- @SessionAttributes
  Declares session attributes used by a specific handler
- @CookieValue
  Allows a method parameter to be bound to the value of an HTTP cookie
- @RequestHeader
  Allows a method parameter to be bound to a request header

Advanced @RequestMapping

- @PathVariable
  Method parameter to indicate that a method parameter should be bound to the value of a URI template variable

```
@Controller
  @RequestMapping("/owners/{ownerId}")
   public class RelativePathUriTemplateController {
      @RequestMapping(value = "/pets/{petId}”)
          public void findPet(@PathVariable String ownerId,
          @PathVariable String petId, Model model) {
          // implementation omitted
          }
   }
```

Advanced @ModelAttribute

- @ModelAttribute has two usage scenarios in controllers.
- When you place it on a method parameter, it maps a model attribute to the specific, annotated method parameter

```
public String processSubmit(@ModelAttribute("pet")
 Pet pet, BindingResult result, SessionStatus status)
```

- You can also use it at the method level to provide *reference data* for the model

```
@ModelAttribute("types")
 public Collection<PetType>  populatePetTypes()  {
            return this.clinic.getPetTypes();
 }
```

View & View Resolvers

- The two interfaces that are important to the way Spring handles views are ViewResolver and View.
  - The ViewResolver provides a mapping between view names and actual views.
  - The View interface renders the output of the request to the client

View

- Implements the *View interface*
- The View interface addresses the preparation of the request and hands the request over to one of the view technologies
- Built-in support for
  - JSP, XSLT, Velocity, Freemaker
  - Excel, PDF, JasperReports

View Resolvers

- Resolves logical view names returned from controllers into *View objects*
- Implements *ViewResolver interface*
  - *View resolveViewName(String viewName, Locale locale) throws Exception*
- Spring provides several implementations
  - *UrlBasedViewResolver*
  - *BeanNameViewResolver*
  - *ResourceBundleViewResolver*
  - *XmlViewResolver*

ResourceBundleViewResolver

- When you combine different view technologies in a web application, you can use the ResourceBundleViewResolver.

```
<bean id="viewResolver"
class="org.springframework.web.servlet.view.ResourceBundleViewResolv
er">
        <property name="basename" value="views"/>
        <property name="defaultParentView" value="parentView"/>
</bean>
```

- The ResourceBundleViewResolver inspects the ResourceBundle identified by the basename, and for each view it is supposed to resolve, it uses the value of the property [viewname].(class) as the view class and the value of the property [viewname].url as the view url.

UrlBasedViewResolver

- With JSP as a view technology, you can use the UrlBasedViewResolver.
- This view resolver translates a view name to a URL and hands the request over to the RequestDispatcher to render the view.

```
<bean id="viewResolver"
class="org.springframework.web.servlet.view.UrlBasedViewResolver"
>
   <property name="viewClass“

value="org.springframework.web.servlet.view.JstlView"/>
   <property name="prefix" value="/WEB-INF/jsp/"/>
   <property name="suffix" value=".jsp"/>
</bean>
```

- When returning test as a logical view name, this view resolver forwards the request to the RequestDispatcher that will send the request to /WEB-INF/jsp/test.jsp.

Chaining View Resolver

- Spring supports multiple view resolvers.
- Chain resolvers and override specific views in certain circumstances.
- This is done by adding more than one resolver to your application context
- Set the order property to specify ordering. Remember, the higher the order property, the later the view resolver is positioned in the chain

Chaining View Resolver

```
<bean id="jspViewResolver" class=
"org.springframework.web.servlet.view.InternalResourceViewResolver">
          <property name="viewClass"
                  value="org.springframework.web.servlet.view.JstlView"/>
          <property name="prefix" value="/WEB-INF/jsp/"/>
          <property name="suffix" value=".jsp"/>
  </bean>
 <bean id="excelViewResolver"
  class="org.springframework.web.servlet.view.XmlViewResolver">
          <property name="order" value="1"/>
          <property name="location" value="/WEB-INF/views.xml"/> </bean>

<!-- in views.xml -->
 <bean name="report" class="org.springframework.example.ReportExcelView"/>
```

Thank You!